

Claims

- [c1] A method of polishing a layer of a substrate, comprising:
providing a polishing apparatus adapted to impart relative movement between a polishing pad and a substrate having a first layer to be polished;
providing a liquid medium having a pH between 4 and 11 to an interface between said substrate and said polishing pad, said liquid medium including a pH controlling substance including at least one of an acid and a base, and further including a carbonate, and a stabilizer additive comprising at least one selected from the group consisting of amino acids and polyacrylic acid; and
moving at least one of said substrate and said polishing pad relative to said other of said substrate and said pad to polish said layer of said substrate.
- [c2] The method of claim 1 wherein said pH controlling substance is a base, and said stabilizer additive includes at least an amino acid, said polishing method being applied to polishing an oxide layer.
- [c3] The method of claim 2 wherein said polishing is performed with a polishing pad having a fixed abrasive.

- [c4] The method of claim 1 wherein said pH controlling substance is an acid, said pH of said liquid medium ranges between about 4.2 and about 5, and said stabilizer additive includes polyacrylic acid, said method being applied to polish an oxide layer.
- [c5] The method of claim 2 wherein said pH controlling substance is a base, said pH is adjusted to a range between 9.5 and 12.
- [c6] The method of claim 3 wherein said stabilizer additive is selected from the group consisting of L-proline, glycine and lysine and polyacrylic acid.
- [c7] The method of claim 4 wherein said base includes a hydroxide of an alkali earth metal.
- [c8] The method of claim 4 wherein said base is selected from the group consisting of hydroxides of alkali earth metals and ammonium hydroxide.
- [c9] The method of claim 5 wherein said carbonate includes a carbonate salt of said alkali earth metal.
- [c10] The method of claim 5 wherein said base includes potassium hydroxide and said carbonate salt includes potassium carbonate.
- [c11] The method of claim 6 wherein said carbonate is pro-

vided in said liquid medium by adding said carbonate salt to said liquid medium.

- [c12] The method of claim 3 wherein said fixed abrasive component of said polishing pad includes at least one of alumina, and ceria.
- [c13] The method of claim 12 wherein said polishing pad is moved in a linear direction relative to said substrate.
- [c14] The method of claim 3 wherein said polishing is performed to expose a second layer underlying said first layer.
- [c15] The method of claim 14 wherein said first layer comprises an oxide of silicon, said second layer comprises silicon nitride and said polishing is performed until said first layer is planarized to a level of said second layer.
- [c16] A chemical mechanical polishing method of planarizing an oxide layer of a semiconductor substrate, comprising:
 - providing a semiconductor substrate having an oxide layer having at least one of a step height difference and uneven overfill above an underlying layer;
 - contacting said substrate with a fixed abrasive pad;
 - providing a liquid medium having a pH between about 9.5 and 12 to an interface between said substrate and said fixed abrasive pad, said liquid medium including a

base selected from the group consisting of hydroxides of alkali earth metals and ammonium hydroxide, and further including a carbonate and a stabilizer additive comprising at least one selected from an amino acid and polyacrylic acid; and
polishing said exposed oxide layer by moving at least one of said substrate and said abrasive pad relative to said other of said substrate and said abrasive pad.

[c17] The method of claim 16 wherein said stabilizer additive is selected from the group consisting of L-proline, glycine, and lysine and polyacrylic acid.

[c18] The method of claim 17 wherein said oxide layer includes material formed in trenches within said underlying layer, such that said polishing is performed to planarize said oxide layer to remove said step height differences and said uneven overfill above said second layer.

[c19] A chemical mechanical polishing system for planarizing a layer of a substrate, comprising:
a polishing member including a polishing pad for contacting a substrate;
a chuck adapted to hold a substrate in movable contact with said polishing member;
a drive coupled to at least one of said polishing member and said chuck, said drive adapted to impart relative

motion between said polishing member and said chuck at an interface; and
a liquid medium having a pH between about 4 and 11, provided to said interface, said liquid medium including a pH controlling substance selected from an acid and a base, and further including a carbonate, and a stabilizer additive including at least one selected from the group consisting of amino acids and polyacrylic acid.

[c20] The system of claim 19 wherein said polishing pad includes a fixed abrasive.

[c21] The system of claim 20 wherein said pH controlling substance is selected from the group consisting of hydroxides of alkali earth metals and ammonium hydroxide, said carbonate includes a carbonate salt of said base, and said stabilizer additive is selected from the group consisting of L-proline, glycine, and lysine and polyacrylic acid.